

CLAIMS

- 1 1. An operator used in connection with a door having a counterbalance system  
2 including an axle, comprising, a motor assembly, a gear assembly  
3 operatively interconnected with said motor such that said motor causes  
4 rotation thereof, a bore in said gear assembly adapted to receive the axle  
5 which is rotatable with said gear assembly and a gear segment of said gear  
6 assembly that is removable to radially open said gear assembly and allow  
7 insertion of the axle into said bore.
  
- 1 2. The operator of claim 1, wherein said motor assembly includes a drive gear  
2 rotatable with said motor and engageable with a gear surface formed on  
3 said gear assembly.
  
- 1 3. The operator of claim 2, wherein said gear assembly includes an outer rim,  
2 said gear surface being formed interiorly of said rim, said drive gear  
3 engaging said gear surface interiorly of said rim.
  
- 1 4. The operator of claim 3, wherein said rim extends axially inward to an  
2 extent substantially the same as or greater than the axial extension of said  
3 drive gear, whereby said drive gear is housed within said gear assembly.
  
- 1 5. The operator of claim 1, wherein said gear segment is slidably received  
2 within said gear assembly, and is removable in a direction parallel to the  
3 axle.
  
- 1 6. The operator of claim 5, wherein said gear assembly includes a hub  
2 defining said bore, a rim spaced radially from said hub, and a gear surface  
3 formed on said rim and engageable with a drive gear associated with said  
4 motor and rotatable therewith, wherein said gear segment includes a  
5 removable gear portion and a removable hub portion.

- 1    7.    The operator of claim 6, wherein said hub is divided into a first half and a  
2        second half, said first half being removable and interconnected with said  
3        removable portion of said rim by a removable wall portion, whereby said  
4        gear segment may be removed in a unitary fashion.
  
- 1    8.    The operator of claim 7, wherein said gear segment is selectively attached  
2        to said gear assembly by a fastener.
  
- 1    9.    The operator of claim 8, wherein said gear segment includes a laterally  
2        extending tab that overlaps a portion of said gear assembly, wherein said  
3        gear segment is attached at said tab.
  
- 1    10.   The operator of claim 9, wherein said gear segment includes a backing  
2        plate extending radially between said removable rim portion and said first  
3        hub half and spaced axially outward of said rim, wherein said tab extends  
4        laterally from said backing plate.
  
- 1    11.   The operator of claim 10, wherein a pair of tabs extend from said backing  
2        plate and wherein a pair of fasteners extends through said tabs into said  
3        gear assembly to attach said gear segment thereto.
  
- 1    12.   The operator of claim 11, further comprising means for clamping said first  
2        and second hub halves together.
  
- 1    13.   The operator of claim 12, wherein said means for clamping said hub halves  
2        together includes a lip carried on at least one of said hub halves and a  
3        receiver formed on the other of said hub halves defining a slot extending in  
4        the axial direction for receipt of said lip.

- 1 14. The operator of claim 13, wherein said lip has an outwardly facing surface  
2 that slopes inwardly as it extends outwardly from said one of said hub  
3 halves in the axial direction, and wherein said receiver has an inwardly  
4 facing surface having substantially the same slope as said outwardly facing  
5 surface on said lip, wherein said surfaces are engageable upon insertion of  
6 said lip in said receiver.
  
- 1 15. The operator of claim 12, wherein said means for clamping said hub halves  
2 together includes a pair of lips extending axially inward from said first hub  
3 half and a pair of receivers supported on said second hub half located  
4 axially inward of a radially extending end wall on said gear assembly, said  
5 receivers defining axially extending slots adapted to receive said lips on said  
6 first hub half.
  
- 1 16. The operator of claim 15, wherein said means for clamping further  
2 comprises a pair of lips extending axially outward from said second hub  
3 half and a pair of receivers supported on said first hub half and located  
4 axially outward of said end wall, said receivers defining slots adapted to  
5 receive said lips on said second hub half upon insertion of said gear  
6 segment.
  
- 1 17. The operator of claim 16, wherein said lips have outwardly facing surfaces  
2 that are tapered inwardly as the lips extend axially outward from said end  
3 wall, and said receivers have inwardly facing surfaces that taper inwardly  
4 as they extend axially outward from said end wall, said inward facing  
5 surfaces of said receivers and said outward facing surfaces of said lips being  
6 engageable upon insertion of said gear assembly.

- 1 18. The operator of claim 17 further comprising, a locking collar slidingly
- 2 received over at least one of said first and second hub halves and fastenable
- 3 to said end wall.
  
- 1 19. The operator of claim 18, wherein said end wall carries an axially outward
- 2 extending projection and wherein said locking collar includes a radially
- 3 extending portion adapted to fit over said projection upon sliding said
- 4 clamping ring over said hub.
  
- 1 20. An operator for use in connection with a door system having an axle
- 2 comprising, an operator framework supporting an operator motor, said
- 3 operator framework defining a clearance adapted to insertably receive the
- 4 axle therein, a gear assembly defining a bore in which the axle is received
- 5 and including a removable gear segment adapted to selectively medially
- 6 open said bore to receive the axle, wherein said motor is interconnected
- 7 with said gear assembly to cause rotation thereof.
  
- 1 21. The operator of claim 20, wherein said operator framework includes a
- 2 channel that opens toward the axle defining said clearance.
  
- 1 22. The operator of claim 21, wherein said channel has a generally U-shaped
- 2 section.
  
- 1 23. The operator of claim 20 further comprising, a drive train, wherein said
- 2 drive train interconnects said motor to said gear assembly.
  
- 1 24. The operator of claim 20, wherein said operator motor is pivotally
- 2 mounted.

- 1 25. An operator for use in connection with a door system having an axle
- 2 comprising, a motor assembly including a motor, means for interconnecting
- 3 said motor assembly to the axle, wherein a portion of said means for
- 4 interconnecting the motor assembly is removable to allow radial insertion
- 5 of the axle during installation, and means for attaching said portion to said
- 6 means for interconnecting.
- 1 26. The operator of claim 25, wherein said motor assembly is pivotable about
- 2 an axis running parallel to the axle between a generally horizontal
- 3 unlocked position and generally vertical locked position, wherein said
- 4 motor assembly includes a spring engageable with said motor and adapted
- 5 to counterbalance the weight of said motor in said unlocked position.
- 1 27. An operator used in connection with a counterbalance system having an
- 2 axle comprising, a motor, a worm wheel operatively interconnected with
- 3 said motor, said worm wheel lying along an axis parallel to the axle,
- 4 wherein said motor is pivotable about said axis between a generally
- 5 horizontal unlocked position and generally vertical locked position, and a
- 6 spring having an end engageable with said motor for applying a torsional
- 7 force thereto.
- 1 28. The operator of claim 27, wherein said spring is a coil spring located
- 2 coaxially with said worm wheel and wherein said end of said spring
- 3 engages said worm wheel for application of said torsional force to said
- 4 motor.
- 1 29. The operator of claim 27, wherein said spring is adapted to counterbalance
- 2 the weight of said motor in said unlocked position and wherein said spring
- 3 urges said motor toward said unlocked position.